

## Üslü Sayılar:

$$a^n = \underbrace{a \cdot a \cdot a \cdot \dots \cdot a}_n$$

n tane a'nın çarpımı

a: taban  
n: üs

$$* 3^3 = 3 \cdot 3 \cdot 3 = 27$$

$$* 5^2 = 5 \cdot 5 = 25$$

not:  $a + a + a + \dots + a = na$   
n tane a'nın toplamı

### \* Parantez ve İşaretler:

\*  $(+)^n$ : pozitif sayıların tüm kuvvetleri pozitifdir.

\*  $(-)^{2n}$ : parantezin içi negatif üssü çift ise sayı dışarı pozitif çıkar.

\*  $(-)^{2n+1}$ : Parantez içi negatif, üssü tek ise sayı dışarı negatif çıkar.

$$* (5)^3 = 5^3$$

$$* (-5)^3 = -5^3 \text{ (parantez yokken üs, işarete etki edemez)}$$

$$* (-5)^4 = 5^4$$

not: Parantezin içindeki üs, işarete etki etmez.

$$(-3)^2 \neq (-3^2)$$

$$\downarrow \quad \downarrow$$

$$(-3) \cdot (-3) = 9 \quad -3 \cdot 3 = -9$$

$$* a^0 = 1 \quad a \neq 0, \quad 0^0 = \text{tanımsız}$$

$$3^0 = 1 \quad 1^0 = 1 \quad (-1461)^0 = 1$$

$$1791^0 = 1 \quad e^0 = 1 \quad \left(-\frac{2}{13}\right)^0 = 1$$

not: 0, parantezli ifadenin üssü değilse işarete etki etmez.

$$* a \cdot x^n + b \cdot x^n - c \cdot x^n = (a+b-c) \cdot x^n$$

$$* 8^5 + 3 \cdot 8^5 - 4 \cdot 8^5 = (1+3-4) \cdot 8^5 = 0 \cdot 8^5 = 0$$

$$* 4 \cdot 17^3 + 2 \cdot 17^3 = (4+2) \cdot 17^3 = 6 \cdot 17^3$$

$$* a^{-n} = \left(\frac{1}{a}\right)^n, \quad \left(\frac{a}{b}\right)^n = \left(\frac{b}{a}\right)^n$$

$$* 2^{-1} = \left(\frac{1}{2}\right)^1$$

$$* \left(\frac{2}{3}\right)^{-3} = \left(\frac{3}{2}\right)^3$$

$$* 3^{-3} = \left(\frac{1}{3}\right)^3$$

$$* \left(-\frac{2}{3}\right)^{-3} = -\left(\frac{3}{2}\right)^3$$

$$* -3^{-3} = -\left(\frac{1}{3}\right)^3$$

$$* \left(-\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2$$

$$a^x \cdot a^y = a^{x+y} \rightarrow 2^3 \cdot 2^5 = 2^8$$

$$\frac{a^x}{a^y} = a^{x-y} \rightarrow \frac{2^3}{2^5} = 2^{3-5} = 2^{-2} = \left(\frac{1}{2}\right)^2$$

$$(a^b)^c = a^{b \cdot c} \rightarrow (-2^3)^2 = (2)^6 = 64$$

$$a^x \cdot b^x = (a \cdot b)^x \rightarrow 12^x = (2 \cdot 2 \cdot 3)^x = 2^x \cdot 2^x \cdot 3^x$$

$$\frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x \rightarrow \frac{6^x}{3^x} = \left(\frac{6}{3}\right)^x = 2^x$$

$$a^{\frac{x}{n}} = b^{\frac{y}{n}} \rightarrow 5^1 = 2^x \Rightarrow 5^{\frac{1}{x}} = 2^{\frac{x}{x}} = 2$$

$$\left. \begin{array}{l} a^x = b^y \\ a^z = b^t \end{array} \right\} \frac{x}{z} = \frac{y}{t} \rightarrow \left. \begin{array}{l} 2^x = 3^4 \\ 2^9 = 3^x \end{array} \right\} \frac{x}{9} = \frac{4}{x}$$

$$x^2 = 36$$

$$x = \pm 6$$

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2001-ÖSS:  $\left[(-\frac{1}{2})^{-3}\right]^2 = ?$

Çözüm:  $(\frac{1}{2})^{-6} = (2)^6 = \boxed{64}$

1989-ÖSS:  $\left[(-\frac{1}{2})^{-1}\right]^3 = ?$

Çözüm:  $(-\frac{1}{2})^{-3} = (-2)^3 = \boxed{-2^3}$

1983-ÖYS:  $(\frac{1}{2})^2 : (-\frac{1}{2})^6 = ?$

Çözüm:  $\frac{1}{4} : \frac{1}{64} = \frac{1}{4} \cdot \frac{64}{1} = 16 = \boxed{2^4}$

1993-ÖYS:  $\frac{3^2 + (-2)^3}{(-1)^4 + 2^2} = ?$

Çözüm:  $\frac{9-8}{1+4} = \boxed{\frac{1}{5}}$

1986-ÖSS:  $\frac{(-\frac{1}{2})^3 \cdot (-2^4)}{(-2)^2} = ?$

Çözüm:  $\frac{-\frac{1}{8} \cdot -16}{4} = \frac{2}{4} = \boxed{\frac{1}{2}}$

1997-ÖSS:  $(2^{-1} + 2^0)^{-2} \cdot 3^2 = ?$

Çözüm:  $(\frac{1}{2} + 1)^{-2} \cdot 9 = (\frac{3}{2})^{-2} \cdot 9 = (\frac{2}{3})^2 \cdot 9 = \frac{4}{9} \cdot 9 = \boxed{4}$

2001-ÖSS:  $\left(\frac{(\frac{1}{2})^{-1} : (\frac{1}{2})^2}{(\frac{1}{2})^3}\right)^{\frac{1}{2}} = ?$

Çözüm:  $(2 : \frac{1}{4} : \frac{1}{8})^{\frac{1}{2}} = (2 \cdot \frac{4}{1} \cdot \frac{8}{1})^{\frac{1}{2}} = 64^{\frac{1}{2}} = (8^2)^{\frac{1}{2}} = \boxed{8}$

2004-ÖSS:  $(-\frac{1}{8})^{-\frac{2}{3}} = ?$

Çözüm:  $(-\frac{8}{1})^{\frac{2}{3}} = [(-2)^3]^{\frac{2}{3}} = (-2)^2 = \boxed{4}$

2011-YGS:  $\frac{4^{\frac{1}{2}} + (-8)^{\frac{1}{3}} - 1}{2^{-1}} = ?$

Çözüm:  $\frac{(2^{\frac{1}{2}})^{\frac{1}{2}} + [(-2)^3]^{\frac{1}{3}} - 1}{\frac{1}{2}} = \frac{2 + -2 - 1}{\frac{1}{2}} = \frac{-1}{\frac{1}{2}} = \boxed{-2}$

2012-YGS:  $\frac{6^{-2} - 4 \cdot 6^{-3}}{3^{-2} - 2 \cdot 3^{-3}} = ?$

Çözüm:  $\frac{\frac{1}{36(6)} - 4 \cdot \frac{1}{216}}{\frac{1}{9} - 2 \cdot \frac{1}{27}} = \frac{\frac{6-4}{216}}{\frac{3-2}{27}} = \frac{2}{27} \cdot \frac{27}{1} = \boxed{\frac{1}{4}}$

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2005-ÖSS:  $\frac{2^{12} + 2^{13}}{2^{14} - 2^{15}} = ?$

Çözüm:  $\frac{2^{12}(1+2^1)}{2^{12}(2^2-2^3)} = \frac{3}{4-8} = \boxed{-\frac{3}{4}}$

1993-ÖSS:  $\frac{2^{93} - 2^{92}}{2^{94}} = ?$

Çözüm:  $\frac{2^{92}(2^1-1)}{2^{92} \cdot 2^2} = \boxed{\frac{1}{4}}$

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2010-YGS:  $15^{13} + 6 \cdot 15^{13} + 8 \cdot 15^{13} = ?$

Çözüm:  $(1+6+8) \cdot 15^{13} = 15 \cdot 15^{13} = \boxed{15^{14}}$

1998-ÖYS:  $\frac{14^a + 14^a}{7^a + 7^a + 7^a + 7^a} = 32$  ise  $a = ?$

Çözüm:  $\frac{2 \cdot 14^a}{2 \cdot 7^a} = \frac{2^a \cdot 2^a}{2 \cdot 7^a} = \frac{2^a}{2} = 2^{a-1}$

$2^{a-1} = 32$  ise  $a-1=5$ ,  $\boxed{a=6}$



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**1990-ÖSS:**  $3(a^2)^3 - 2(a^3)^2 - a^5 = ?$

**Çözüm:**  $3a^6 - 2a^6 - a^5 = a^6 - a^5$

**1987-ÖSS:** a pozitif bir sayı ise aşağıdakilerden hangisi negatiftir?  
A)  $a^{-2}$  B)  $a^{-1}$  C)  $-(-a)^3$  D)  $(-a)^2$  E)  $-a^{-3}$

**Çözüm:** a=1 olsun

$a^{-2} = 1^{-2} = 1$

$a^{-1} = 1^{-1} = 1$

$-(-a)^3 = -(-1)^3 = -(-1) = 1$

$(-a)^2 = (-1)^2 = +1$

$-a^{-3} = -1^{-3} = -1$

**1985-ÖSS:**  $(-a)^7 \cdot (-a^4) \cdot (-a)^{-2} = ?$

**Çözüm:**  $-a^7 \cdot -a^4 \cdot a^{-2} = +a^{7+4-2} = a^9$

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**2010-YGS:**  $(16)^{3n} = 8^5$  ise n=?

**Çözüm:**  $(2^4)^{3n} = (2^3)^5$ ,  $2^{12n} = 2^{15}$

$12n = 15$ ,  $n = \frac{15}{12} = \frac{5}{4}$ ,  $n = \frac{5}{4}$

**2003-ÖSS:**  $4 - 4^x + 3^x \cdot 4^{x+1} = \frac{48}{12^{1-x}}$ , x=?

**Çözüm:**  $4 - 4^x + 3^x \cdot 4^x \cdot 4 = \frac{48^4}{12 \cdot 12^{-x}}$

$4 - 4^x + 4 \cdot 12^x = 4 \cdot 12^x$ ,  $4 = 4^x$ ,  $x = 1$

**1999-ÖSS:**  $3 \cdot 2^{x+2} + 4 \cdot 2^x = 8$  ise x=?

**Çözüm:**  $3 \cdot 2^x \cdot 2^2 + 4 \cdot 2^x = 8$

$12 \cdot 2^x + 4 \cdot 2^x = 8$ ,  $16 \cdot 2^x = 8$

$2^x = \frac{8}{16} = \frac{1}{2} = 2^{-1}$

$2^x = 2^{-1}$ ,  $x = -1$

Sayfa: C<sub>3</sub>

#cyhnyvz#

**1997-ÖSS:**  $\frac{3^{n+1} + 3^n}{2 \cdot 3^{n-2}} + \frac{2^n - 2^{n-1}}{2^{n-2}} = ?$

**Çözüm:**  $\frac{3^n(3+1)}{2 \cdot 3^{n-2}} + \frac{2^n(1-2^{-1})}{2^{n-2}} = \frac{4}{2} + \frac{1-\frac{1}{2}}{\frac{1}{4}}$   
 $= \frac{4}{1} \cdot \frac{9}{2} + \frac{1}{2} \cdot \frac{4}{1} = 18 + 2 = 20$

**1987-ÖSS:**  $2^{x+1} + 6(2^x) + 4 \cdot (2^{x-1}) = 80$ , x=?

**Çözüm:**  $2^x \cdot 2 + 6 \cdot 2^x + 4 \cdot 2^x \cdot 2^{-1} = 80$

$2^x(2+6+4 \cdot \frac{1}{2}) = 80$ ,  $2^x \cdot 8 = 80$

$2^x = 8$  ise  $x = 3$

**1996-ÖSS:**  $54 \cdot 3^x + 3^{x+3} - 729 = 0$ , x=?

**Çözüm:**  $54 \cdot 3^x + 3^x \cdot 3^3 = 729$

$3^x(54+27) = 729$ ,  $3^x(81) = 729$

$3^x = 9$ ,  $x = 2$

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**2009-ÖSS:**  $3^m = 2$  ise  $3^{2m+1} = ?$

**Çözüm:**  $3^{2m+1} = 3^m \cdot 3^m \cdot 3^1 = 2 \cdot 2 \cdot 3 = 12$

**2001-ÖSS:**  $x > 0$ ,  $a = 2^x$  ise

$\frac{4^{x+1} - 4}{2^{x+1} - 2} = ?$

**Çözüm:**  $2^x = a$  ise  $2^x \cdot 2^x = 4^x = a^2$

$\frac{4^x \cdot 4 - 4}{2^x \cdot 2 - 2} = \frac{4a^2 - 4}{2a - 2} = \frac{4(a^2 - 1)}{2(a - 1)} = \frac{2(a-1)(a+1)}{(a-1)} = 2(a+1)$

**2001-ÖSS:**  $3^m = a$ ,  $7^m = b$  ise  $(147)^m = ?$

**Çözüm:**  $(147)^m = (7 \cdot 7 \cdot 3)^m = 7^m \cdot 7^m \cdot 3^m = a \cdot b^2$

**1996-ÖSS:**  $2^x = a$ ,  $3^x = b$  ise  $72^x = ?$

**Çözüm:**  $72^x = (2 \cdot 2 \cdot 2 \cdot 3 \cdot 3)^x = 2^x \cdot 2^x \cdot 2^x \cdot 3^x \cdot 3^x = a^3 \cdot b^2$

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**2013-YGS:**  $\frac{2^{-2}}{\frac{1}{4} + \frac{1}{m-1}} = 13^{-1}$  ise  $m = ?$

**Çözüm:**  $\frac{\frac{1}{4}}{\frac{1}{4} + \frac{1}{m}} = \frac{1}{13}$  ,  $\frac{\frac{1}{4}}{\frac{1+4m}{4}} = \frac{1}{13}$

$\frac{1}{1+4m} \neq \frac{1}{13}$  ,  $13 = 1+4m$  ,  $12 = 4m$  ,  $m = 3$

**2013-YGS:**  $2^x = 6^{x+y-1}$  ise  $3^x = ?$

**Çözüm:**  $2^x = 6^x \cdot 6^{y-1}$   
 $2^x = 2^x \cdot 3^x \cdot 6^{y-1}$   
 $\frac{1}{6^{y-1}} = 3^x$  ,  $3^x = 6^{1-y}$

**2012-LYS:**  $(\sqrt{7}+\sqrt{3})^x = 4$  ise  $(\sqrt{7}-\sqrt{3})^x = ?$

**Çözüm:**  $(\sqrt{7}+\sqrt{3})^x = 4$   
 $x(\sqrt{7}-\sqrt{3})^x = A$   
 $4^x = 4A$  ,  $A = \frac{4^x}{4}$  ,  $A = 4^{x-1}$

**2012-LYS:**  $\frac{3^x}{2^{2x}} = \frac{1}{5}$  ise  $5^{\frac{1}{x}} = ?$

**Çözüm:**  $\frac{3^x}{(2^2)^x} = \frac{1}{5}$  ,  $\frac{3^x}{4^x} = \frac{1}{5}$  ,  $\frac{5}{1} = \frac{4^x}{3^x}$   
 $5^1 = \left(\frac{4}{3}\right)^x \rightarrow 5^{\frac{1}{x}} = \left(\frac{4}{3}\right)^{\frac{x}{x}} = \frac{4}{3}$

**2012-YGS:**  $2^x - 2^{-y}(2^{x+y}-2) = ?$

**Çözüm:**  $2^x - 2^x + 2^{-y} + 2^{-y+1} = 2^{-y+1}$

**2011-YGS:**  $12^a = 2$  ,  $6^b = 3$  ise  $12^{(1-a) \cdot 2b} = ?$

**Çözüm:**  $12^{1-a} = 12 \cdot 12^{-a} = \frac{12}{12^a} = \frac{12}{2} = 6$

$12^{(1-a) \cdot 2b} = 6^{2b} = 6^b \cdot 6^b = 3 \cdot 3 = 9$

**2011-YGS:**  $\frac{2^{x^2-y^2}}{4^{x^2+xy}} = \frac{1}{2}$  ise  $(x+y)^2 = ?$

**Çözüm:**  $\frac{2^{x^2-y^2}}{(2^2)^{x^2+xy}} = 2^{-1}$  ,  $2^{x^2-y^2-2x^2-2xy} = 2^{-1}$

$\Rightarrow -x^2-2xy-y^2 = -1 \Rightarrow x^2+2xy+y^2 = 1$

$(x+y)^2 = 1$

**2009-ÖSS:**  $3^x = 5^y$  ,  $3^z = 5^t$  ise  $x, y, z, t$  arasındaki bağıntı nedir?

**Çözüm:**  $\begin{cases} 3^x = 5^y \\ 3^z = 5^t \end{cases} \Rightarrow \frac{x}{z} = \frac{y}{t}$  ,  $x \cdot t = y \cdot z$

**2007-ÖSS:**  $\frac{3^{2x} - 2 \cdot 3^{x+y} + 3^{2y}}{3^{2x} - 3^{x+y}} = ?$

**Çözüm:**  $3^x = a$  ,  $3^y = b$  olsun.

$\frac{a^2 - 2ab + b^2}{a^2 - ab} = \frac{(a-b)^2}{a(a-b)} = \frac{a-b}{a} = 1 - \frac{b}{a}$

$\Rightarrow 1 - \frac{3^y}{3^x} = 1 - 3^{y-x}$

**2005-ÖSS:**  $2^a = 3$  ,  $3^b = 4$  ,  $4^c = 8$  ise  $a \cdot b \cdot c = ?$

**Çözüm:**  $\begin{cases} 2^a = 3^1 \\ 2^2 = 3^b \end{cases} \Rightarrow \frac{a}{2} = \frac{1}{b} \rightarrow a \cdot b = 2$   
 $\begin{cases} 4^c = 8 \\ 2^{2c} = 2^3 \end{cases} \Rightarrow 2c = 3, c = \frac{3}{2}$   
 $a \cdot b \cdot c = 2 \cdot \frac{3}{2} = 3$

**2004-ÖSS:**  $x \neq 1$  ,  $2^{x+y} - 2^{x+y+1} - 2^{x+2} = 0$   
 $x$  ile  $y$  arasındaki bağıntı nedir?

**Çözüm:**  $2^{x+y}(2^x-2) - (2^x-2) = 0$   
 $(2^x-2)(2^{x+y}-1) = 0$  ,  $2^x = 2^1$  ,  $2^{x+y} = 1$   
 $x \neq 1 \checkmark x+y=0$

**1995-ÖSS:**  $2^{a-1}=4$  ise  $4^{a-1}=?$

**Çözüm:**  $2^a \cdot 2^{-1}=4$ ,  $2^a \cdot \frac{1}{2}=4$ ,  $2^a=8$

$4^{a-1} = \frac{4^a}{4} = \frac{2^a \cdot 2^a}{4} = \frac{8 \cdot 8}{4} = \boxed{16}$

**1993-ÖSS:**  $5^x=4$  ise  $(125)^x + 5^{x+2}=?$

**Çözüm:**

$(125)^x + 5^{x+2} = (5 \cdot 5 \cdot 5)^x + 5^x \cdot 5^2 = 5^x \cdot 5^x \cdot 5^x + 5^x \cdot 25$   
 $= 4 \cdot 4 \cdot 4 + 4 \cdot 25 = 64 + 100 = \boxed{164}$

**1994-ÖSS:**  $6^{x+1}=3^{x+2}$  ise  $2^{x+1}=?$

**Çözüm:**  $2^{x+1} \cdot 3^{x+1} = 3^{x+2}$ ,  $\boxed{2^{x+1}=3}$

**1977-ÖSS:**  $y=2^x$  ise  $2^{x+3}=?$

**Çözüm:**  $2^{x+3} = 2^x \cdot 2^3 = y \cdot 8 = \boxed{8y}$

**1982-ÖSS:**  $\frac{1}{a^{x-y}+1} + \frac{1}{a^{y-x}+1}=?$

**Çözüm:**

$\frac{1}{\frac{a^x}{a^y}+1} + \frac{1}{\frac{a^y}{a^x}+1} = \frac{1}{\frac{a^x+a^y}{a^y}} + \frac{1}{\frac{a^y+a^x}{a^x}}$   
 $= \frac{a^y+a^x}{a^x+a^y} = \boxed{1}$

**1982-ÖSS:**  $\left(\frac{a^x}{a^y}\right)^{x-y} \cdot \left(\frac{a^y}{a^x}\right)^{x-y}=?$

**Çözüm:**

$\left[\frac{a^x}{a^y} \cdot \frac{a^y}{a^x}\right]^{x-y} = 1^{x-y} = \boxed{1}$

**1994-ÖSS:**  $m, n \in \mathbb{Z}$ ,  $\left(\frac{1}{n}\right)^m = 8$  ise

$m+n=?$

**Çözüm:**  $\left(\frac{1}{2}\right)^{-3}$  ise  $m+n = 2-3 = \boxed{-1}$

$\left(\frac{1}{8}\right)^{-1}$  ise  $m+n = 8-1 = 7$

\* Bu soruda m+n kaç olabilir diye sorulmalıydı!..

Sayfa: C5

#cyhnyvz #

## Gök büyük ve Gök küçük Sayılar

$10^3 = 1000$

$12 \cdot 10^7 = 120000000$

$5 \cdot 10^{-3} = 0,005$

$0,16 \cdot 10^{-3} = 1,6 \cdot 10^{-4} = 16 \cdot 10^{-5}$

**2003-ÖSS:**  $\frac{(0,005 \cdot 10^{35}) + (0,8 \cdot 10^{33})}{10^{32}}=?$

**Çözüm:**  $\frac{5 \cdot 10^{32} + 8 \cdot 10^{32}}{10^{32}} = \frac{13 \cdot 10^{32}}{10^{32}} = \boxed{13}$

**1996-ÖSS:**  $\left(\frac{0,018}{0,006}\right)^{a+1} = (27)^{1-a}$ ,  $a=?$

**Çözüm:**  $\left(\frac{3 \cdot 10^{-3}}{6 \cdot 10^{-3}}\right)^{a+1} = (3^3)^{1-a}$

$3^{a+1} = 3^{3-3a}$ ,  $a+1=3-3a$ ,  $4a=2$ ,  $\boxed{a=\frac{1}{2}}$

**1995-ÖSS:**  $(0,027)^{\frac{5}{3}} \cdot 10^5=?$

**Çözüm:**  $(27 \cdot 10^{-3})^{\frac{5}{3}} \cdot 10^5 = (3^3)^{\frac{5}{3}} \cdot (10^{-3})^{\frac{5}{3}} \cdot 10^5$   
 $= 3^5 \cdot 10^{-5} \cdot 10^5 = \boxed{3^5}$

**1994-ÖSS:**  $\frac{4 \cdot 10^{-3} + 3 \cdot 10^{-4}}{10^{-4}}=?$

**Çözüm:**  $\frac{40 \cdot 10^{-4} + 3 \cdot 10^{-4}}{10^{-4}} = \frac{43 \cdot 10^{-4}}{10^{-4}} = \boxed{43}$

**1982-ÖSS:**  $5 \cdot (0,03)^3=?$

**Çözüm:**  $5 \cdot (3 \cdot 10^{-2})^3 = 5 \cdot 3^3 \cdot 10^{-6} = \boxed{135 \cdot 10^{-6}}$

## Basamak Sayısı:

$10^3 = 1+3=4$  basamak

$3 \cdot 10^4 = 1+4=5$  basamak

$124 \cdot 10^7 = 3+7=10$  basamak

**Örnek:**  $3 \cdot 2^7 \cdot 5^6$  kaç basamaklıdır?

**Çözüm:**  $3 \cdot 2 \cdot 2^6 \cdot 5^6 = 6 \cdot 10^6$

$\boxed{1+6=7}$  basamak



**Örnek:**  $3^x = 16$ ,  $8^y = 9$  ise  $x \cdot y = ?$

**Çözüm:**  $3^x = 2^4$   
 $3^2 = 2^{3y}$  }  $\frac{x}{2} = \frac{4}{3y}$ ,  $3xy = 8$   
 $x \cdot y = \frac{8}{3}$

**Örnek:**  $8^a = 27$   
 $81 = 4^b$  } ise  $\frac{a+b}{b+2a} = ?$

**Çözüm:**  $2^{3a} = 3^3$   
 $2^{2b} = 3^4$  }  $\frac{3a}{2b} = \frac{3}{4}$ ,  $2a = b$

$\frac{a+b}{b+2a} = \frac{a+2a}{2a+2a} = \frac{3a}{4a} = \frac{3}{4}$

**Örnek:**  $32^a = 9$   
 $27 = 16^b$  ise  $\frac{a}{b} = ?$

**Çözüm:**  $2^{5a} = 3^2$   
 $2^{4b} = 3^3$  }  $\frac{5a}{4b} = \frac{2}{3}$ ,  $\frac{a}{b} = \frac{8}{15}$

## # Sıralama #

Sıralama yapılırken üsler ya da tabanlar eşitlenir.

**1996-ÖYS:**

$x = (2^3)^4$ ,  $y = 2^{(3^4)}$ ,  $z = (2^{12})^3$  ise

$x, y, z$  yi sıralayın?

**Çözüm:**  $x = 2^{12}$ ,  $y = 2^{81}$ ,  $z = 2^{36}$ ,  $y > z > x$

**Örnek:**  $a = 8^5$   
 $b = 16^3$   
 $c = 32^2$  } ise  $a, b, c$  yi sıralayın?

**Çözüm:**  $a = (2^3)^5 = 2^{15}$   
 $b = (2^4)^3 = 2^{12}$   
 $c = (2^5)^2 = 2^{10}$  }  $a > b > c$

**Örnek:**  $a = 5^{90}$   
 $b = 16^{36}$   
 $c = 9^{54}$  } ise  $a, b, c$  yi sıralayın?

**Çözüm:**  $a = 5^{90}$   
 $b = (2^4)^{36} = 2^{144}$   
 $c = (3^2)^{54} = 3^{108}$   

90	144	108
10	16	12
5	8	6

OBEB (90, 144, 108) = 18

$a = (5^5)^{18} = 3125^{18}$   
 $b = (2^8)^{18} = 256^{18}$   
 $c = (3^6)^{18} = 729^{18}$  }  $a > c > b$

**Örnek:**  $a = 5^{80}$   
 $b = 4^{100}$   
 $c = 9^{60}$  } ise  $a, b, c$  yi sıralayın?

**Çözüm:**  $a = 5^{80}$   
 $b = 2^{200}$   
 $c = 3^{120}$   

80	200	120
2	5	3

OBEB (80, 200, 120) = 40

$a = (5^2)^{40} = 25^{40}$   
 $b = (2^5)^{40} = 32^{40}$   
 $c = (3^3)^{40} = 27^{40}$  }  $b > c > a$

**Örnek:**  $2^a = 39$   
 $3^b = 85$   
 $5^c = 129$  } ise  $a, b, c$  yi sıralayın?

**Çözüm:**  $2^5 < 39 < 2^6 \rightarrow 2^5 < 2^a < 2^6 \rightarrow 5 < a < 6$   
 $3^4 < 85 < 3^5 \rightarrow 3^4 < 3^b < 3^5 \rightarrow 4 < b < 5$   
 $5^3 < 129 < 5^4 \rightarrow 5^3 < 5^c < 5^4 \rightarrow 3 < c < 4$

$a > b > c$

**Not:**  $a^x = b^y$  ise  $x=y=0$  olmalı.

**Not:**  $a^x = a^y$  ise  $a \neq -1, 0, 1$  için  $x=y$  dir.

**Not:**  $a^b = 1$  ise,   
 •  $b=0$  ve  $a \neq 0$    
 •  $a=1$    
 •  $a=-1$  ve  $b$  çift

**Not:**  $a^x = b^x$  ise,  $x$  tek ise  $a=b$    
  $x$  çift ise  $a=\pm b$

**Örnek:**  $4^{x-y+3} = 3^{2x+y-12}$  ise  $x, y = ?$

**Çözüm:**

Dereceleri sıfır olmalıdır.

$$\begin{array}{r} x-y=-3 \\ + 2x+y=12 \\ \hline 3x=9, x=3, y=6, \boxed{x, y=18} \end{array}$$

**Örnek:**  $(x-4)^{8-2x} = 1$  ise  $x$  kaç olabilir?

**Çözüm:**

- $8-2x=0 \Rightarrow x=4$  (Tabanı 0 yapıyor)
- $x-4=1 \Rightarrow \boxed{x=5}$
- $x-4=-1 \Rightarrow \boxed{x=3}$  (Dereceyi çift yapar)

$$C.K = \{3, 5\}$$

**Örnek:**  $(a+3)^{a^2+3a} = 1$  ise  $C.K = ?$

**Çözüm:**

- $a^2+3a=0$  ise  $\boxed{a=0}$    
  $a=-3$  (tabanı 0 yapıyor)
- $a+3=1 \Rightarrow \boxed{a=-2}$
- $a+3=-1 \Rightarrow \boxed{a=-4}$  (dereceyi çift yapar)

$$C.K = \{-4, -2, 0\}$$

**Örnek:**  $(3x-5)^{2007} = (x+7)^{2007}$  ise

$x$  kaçtır?

**Çözüm:**  $3x-5=x+7, 2x=12, \boxed{x=6}$

**Örnek:**  $(3x-5)^{2012} = (x+7)^{2012}$ ,  $C.K = ?$

**Çözüm:**  $3x-5=x+7 \vee 3x-5=-x-7$    
  $2x=12 \quad \quad \quad 4x=-2$    
  $\boxed{x=6} \quad \quad \quad \vee \quad \boxed{x=-\frac{1}{2}}$

$$C.K = \left\{ -\frac{1}{2}, 6 \right\}$$

**Not:** Eşitsizliklerde tabanın mutlak değeri daima 1 den büyük yapılırsa üstlerde yön değişimi yapılmaz!..

**2008-ÖSS:**  $3^{4-x} \leq 1 \leq 5^{6-x}$ ,  $x$  tam sayılarının toplamı kaçtır?

**Çözüm:**  $3^{4-x} \leq 1 \quad \quad \quad 1 \leq 5^{6-x}$    
  $\downarrow \quad \quad \quad \downarrow$    
  $3^{4-x} \leq 3^0 \quad \quad \quad 5^0 \leq 5^{6-x}$    
  $4-x \leq 0 \quad \quad \quad 0 \leq 6-x$    
  $\boxed{4 \leq x} \quad \quad \quad \boxed{x \leq 6}$    
  $4 \leq x \leq 6 \rightarrow 4+5+6 = \boxed{15}$

**2006-ÖSS:**  $4^{2m-1} > \left(\frac{1}{16}\right)^{m+7}$  ise en küçük  $m$  tam sayısı kaçtır?

**Çözüm:**  $4^{2m-1} > (4^{-2})^{m+7}$    
  $4^{2m-1} > 4^{-2m-14} \rightarrow 2m-1 > -2m-14$    
  $4m > -13$    
  $\downarrow$    
  $\boxed{m=-3}$